

IHS Uses Telemedicine In Eye Care

By Sandra Basu

WASHINGTON—By linking diabetic patients and doctors that could be separated by hundreds of miles, the loss of eyesight in diabetic patients may be prevented. The loss of vision as a result

the prevalence of diabetes is more than twice as high as the general population, diabetic retinopathy is of particular concern to health officials. Like the U.S. diabetic population as a whole, about half of American Indian/Alaska Native

(AI/AN) diabetics fail to get an annual eye exam that could alert them that they need treatment for the condition. In an effort to increase the number of AI/AN diabetics who receive eye exams, IHS health officials are currently expanding a telemedicine initiative that they hope will spur more patients to get an eye exam and prevent blindness.

The system, called the Joslin Vision Network (JVN), includes a camera that allows primary care clinics to take digital photos of the patient's eye. The images are then electronically transferred to the Phoenix Indian Medical Center (PIMC) in Arizona, where a trained reader examines the photo for diabetic

retinopathy, and a report is then sent back to the clinic from where the digital picture came. Proponents of telemedicine efforts, such as these, say that the advantage of its use is that patients in remote locations can access health care and be diagnosed by specialists, who

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IHS ophthalmologist Dr. Mark Horton (r) helps Dr. Dawn Clary read retinal images.

of diabetes, known as diabetic retinopathy, is a leading cause of blindness among adults in the U.S. general population.

In American Indian Country, where

Congress Discusses Indian Suicide Rates

By Sandra Basu

WASHINGTON—At a Senate Indian Affairs Committee hearing last month, legislators questioned why the teen suicide rate among American Indians was so high, as they listened to sobering testimony from both government and nongovernmental groups about the high rates of suicide.

The topic of mental health on reservations has been under greater scrutiny as a result of the March 21

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For BioShield

take eight to 10 years and between \$500 and \$800 million or more to support the clinical trials and development manufacturing processes to bring a product to market. In his written testimony, he said that DoD is looking at ways to speed up its development process.

"We are looking at ways to speed up the overall development process for licensure of potential medical countermeasures, which can take 10-20 years," he said.

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may be hundreds of miles away from them.

The JVN system allows patients to do just that, as well as providing them a convenient way to receive eye exams, according to Dr. Mark Horton, Chief of Eye & ENT at Phoenix Indian Medical Center (PIMC) and director of the Indian Health Service (IHS)/JVN Teleophthalmology Program. The JVN was first deployed at PIMC in 2000. It is now used at 31 IHS sites around the country in 12 states and is expected to be deployed at another 25 to 30 sites over the next 18 months. The equipment comes at no cost to the clinics. Dr. Horton, who is an ophthalmologist, said that the aim of IHS is to use the program to help increase and ensure that all AI/AN diabetics receive an annual eye exam.

"This technology has been deployed in Indian Health Service for the purpose of increasing the compliance in the standards of care for diabetic retinopathy examination, that is to see a larger percentage of our patients with diabetes receive an annual [eye] examination. This technology has been largely effective in this regard," Dr. Horton said.

IHS's diabetic retinopathy telemedicine initiative came about through a partnership between IHS and the Joslin Diabetes Center in Boston. The Center's diabetic retinopathy telemedicine program, JVN, was a program developed largely with federal dollars from the Department of Defense to address the growing unmet need for retinal evaluations for diabetics. All federal entities can use the software for the program for free. Congress specifically appropriated about \$1.5 million to IHS for the purpose of using JVN to decrease the risk of diabetic retinopathy in AI/AN populations and increase the compliance of the standards of care of diabetic retinopathy, according to Dr. Horton.

Diabetic Retinopathy

According to the National Eye Institute (NEI), one of the National Institutes of Health (NIH), diabetic retinopathy is caused by changes in the blood vessels of the retina. In some cases, retinal blood

vessels may swell and leak fluid, while in other cases abnormal new blood vessels grow on the surface of the retina. These changes may cause vision loss or blindness.

Diabetic retinopathy often leads to blindness with little warning. A diabetic's vision may not change until the disease has become severe, which is why regular eye examinations for people with diabetes are considered essential. The longer someone has diabetes, the more likely that the individual will get diabetic retinopathy. Between 40 and 45 per cent of those with diagnosed diabetes have some degree of diabetic retinopathy, according to NEI.

The disease can be treated through laser surgery, in which a light beam is aimed at the retina. With laser surgery and appropriate care, the risk of blindness can be reduced by about 90 per cent. Laser surgery, however, often cannot restore vision that has already been lost.

"Laser treatment is the traditional, only-established treatment for the high-risk forms of diabetic retinopathy. There are new medical treatments that show great promise, but have yet to be proven and to move forward as a standard of care. Laser treatment is the established standard of care for all high-risk forms of diabetic retinopathy," Dr. Horton said.

Although laser treatment can help a diabetic patient, many diabetic patients do not get an eye exam that could detect the condition. Dr. Sven Bursell, director of JVN and an associate professor of ophthalmology at Harvard Medical School in Boston, said that there are several reasons why diabetic patients, in general, may not get an eye exam that could prevent blindness.

"There's...the fact that when you see the ophthalmologist they shine very bright lights into your eyes that for some people can be physically painful. On that level, it may be a barrier for some people receiving or not receiving an eye exam. The other issue, that is probably more problematic, and speaks to the public health side of this, is that a lot of patients in target populations that are high risk, for example African American or Hispanic populations, there may be a significant portion of patients that are underinsured or uninsured, and that may be a barrier," he said.

Another reason that Dr. Bursell pointed to as a deterrent to getting an eye exam is that standard eye exams require dilating the pupil with eye drops, which can be an inconvenience because patients can not safely drive or go about their normal routine for a period of time afterwards. The JVN system, however, does not require the pharmacological dilation of the pupils.

"Patients come in and they don't have to be dilated with eye drops. We check their retinal images and the diagnostic accuracy of these images has been validated and shown to be equivalent to the current clinical gold standard, which is a dilated eye by a retinal specialist and a dilated photographic examination," he said.

Dr. Horton said that JVN is also beneficial to IHS because it can cut down on a patient's travel time to see an eye specialist. Dr. Horton said that the ophthalmologist specialists are typically located in the cities at the larger hospitals and the optometrists are mostly located in clinics at the more remote locations. There are no physician eye specialists at

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the smaller clinics, but some locations have outreach programs wherein specialists travel to remote locations to hold specialty clinics, according to Dr. Horton. Patient travel is often required to obtain the needed examinations. The IHS clinics that are using the JVN, however, can now screen and detect diabetic retinopathy in a primary care clinic through the imaging technology, without an eye specialist on hand. If an eye problem is detected in a patient through the JVN, the clinics can make the necessary referral to an ophthalmologist.

"The idea is that 60 per cent of the patients with diabetes really don't need to see an ophthalmologist at the time of their eye exam. The idea was that because we would be accessing more patients, we could essentially coordinate the appropriate care for the diabetic. So if they have no diabetic retinopathy, they can come back in another year for another imaging session, without having to see an ophthalmologist. Whereas, if we detect a more threatening level of retinopathy, we can refer them to an ophthalmologist immediately. So, we are able to prioritize the appropriate care for the patient, and that way we can save health care dollars because not every diabetic patient needs to go see an ophthalmologist," Dr. Bursell explained.

Leveraging Telemedicine To Prevent Blindness

One of the benefits of the JVN system is that the camera can be set up in a primary care setting, rather than an ophthalmologist's office, since it does not require the supervision of an ophthalmologist. Dr. Horton said that clinics using the JVN typically set up the Joslin camera close to the waiting room of the clinic and take images of the patient's retina during their waiting time.

"When the individual arrives for their visit, whether it be a diabetic exam, hypertension evaluation, or to get their medicine filled, if they are diabetic and haven't had an eye exam in a year, they can quickly get their images captured without the use of eye drops. It takes about 15 minutes. It's totally noninvasive, and then they are immediately introduced back into the clinic where they were before, where they can complete the rest of their activity. Typically, we do this during periods of wait time, when a patient waits for something to occur, like they are waiting for their appointments, or waiting for their medications. We try to leverage that wait time," Dr. Horton said.

The JVN equipment needs to be set up in a dark room and includes a large digital camera that captures the images of a patient's retina, without dilating the eyes with eye drops. Trained staff at the clinic operate the camera. These staff are trained at the IHS/JVN central offices in Phoenix. Dr. Horton said that when the camera takes photographs, the images of the retina appear on a screen. The patient is able to see the images and receives some diabetic retinopathy education using their own images as the basis.

The images are then electronically sent to the national reading center located at PIMC, where all the images are read. At PIMC, there is a large computer monitor that allows the optometrists to view the images in 3D with special goggles. The images are read, and then a report is sent back to the clinic where the patient's eyes were checked that lets the primary care provider and patient know the status of the patient's eyes. The imaging staff at the IHS host sites are also trained to recognize other dangerous eye conditions, so that if they see something

There was a 50 per cent increase in the retinal examination rate and a 51 per cent increase in the laser treatment.

in the images that they are worried about, they can call the reading center and have them read the images immediately.

"I have three full-time readers who are all optometrists who have been to the Joslin Diabetes Center and specifically trained to be telemedicine readers [at the national reading center at PIMC] for the program...If there is any question about a diagnosis, then they get me to adjudicate the read...If non-diabetic retinopathy pathology happens to be present within any of the images, then the optometrist would recognize that and would also include it in the report that would go back to the host site," Dr. Horton said.

Dr. Horton said that because JVN does not require eye drops for dilation, as a standard live exam would, the inconvenience to a patient is minimized, an important benefit of the system. "The patient is very receptive to this and so they are much more likely to then have this occur. The live exam for diabetic retinopathy absolutely requires dilation," he said.

This technology, however, does not eliminate the need for a complete eye exam, according to Dr. Horton, but simply satisfies the standards of care for an annual diabetic retinopathy exam.

"It doesn't check the individual for glasses or any other things that you might do in a live eye exam, but it does satisfy this one standard of care, which is an annual examination to rule out the presence of diabetic retinopathy. Diabetic retinopathy is the leading cause of new blindness among more teenagers and adults in this country, so satisfying such a standard of care in the presence of this standard of care being failed in half the diabetic population makes this a very significant thing," he said.

The Phoenix Experience

PIMC was the pilot site for the first deployment of the JVN within IHS. Dr. Charlton Wilson, associate director of the Phoenix Indian Medical Center Centers of Excellence, said that since JVN's implementation in 2000 there has been an increase in the number of individuals who get eye exams. A study

over a four-year period at PIMC that he and Dr. Horton and additional researchers authored, showed that there was a 50 per cent increase in the retinal examination rate and a 51 per cent increase in the laser treatment rate at the facility.

"We attribute over an observation period of four years, when we put this camera in a primary care setting, that the rate of obtaining a retinal exam increased by 50 per cent. The increase was almost all attributable to the numbers of additional imaging done by JVN. The number of people who had eye exams through the eye clinic did not change over this time. It wasn't that more people went to the eye physician for their eye examinations, it was that this increase, was in fact, related to the numbers of retinal imaging done by JVN. The population also increased during this time by a significant proportion. Had it not been for that retinal imaging equipment, it would have been really tough to even maintain the rate that we started with, which was about 50 per cent," Dr. Wilson said.

Dr. Wilson said the use of the JVN system at PIMC has had a positive effect on eye care and pointed out that the rate of laser treatment increased, which means that more individuals were receiving treatment to save their eyesight.

"During this time the rate of laser treatment, which is really important because you want to not just increase the screening for a condition but to deliver treatment for a condition, increased 50 per cent, without any additional eye care staff at the medical center. What we were able to do is use the JVN to not only keep up with, but also exceed the growth rate for screening, and redirect some of the eye care professionals' work from routine screening toward treatment," he said.

Dr. Wilson said that at PIMC, the camera is placed in a room that is near the clinical exam room. When a patient comes for a primary care visit, staff could have determined at the time of the patient's previous visit that they need to have the eye exam, or it may be decided when the patient arrives for their visit that they need the eye exam. The patient may have no symptoms of diabetic retinopathy when they come, or any indication that they have an eye problem.

"We've had people who have come to our primary care clinic without any symptoms and had a JVN image. The image technician had been able to look at it [the image] and say, 'this is something that we ought to have an eye-care professional read right away.' They send it over the Internet to an eye-care reader and had the eye professional look at it, and they said 'bring him over,' and they had their laser treatment that day," Dr. Wilson said.

He said the process of having images taken is painless for the patient.

"The equipment requires a dark room for it to be useful. We don't use any drops in the eye to dilate the eyes, so the room needs to be dark and black in order for the eyes to dilate enough to get a good image, it can't just be placed in the waiting room because it requires a dark room. You put the person in a dark room, get the equipment adjusted, and get them comfortable in the chair. The camera uses a low light to get images of the retina with real clarity," Dr. Wilson said.

The JVN system, Dr. Wilson said, also enhances their ability to educate patients about diabetic retinopathy.

"We find that it is a tremendous point

of education, as patients can see their eye on the screen, to talk with them about the value of controlling their blood glucose levels, their blood pressure and their lipid levels. We've found that that's very effective in empowering the patient to change behaviors and to take better control of their diabetes," Dr. Wilson said.

As far as the challenges in using the equipment, Dr. Wilson said that it does require training on the part of the individual who takes the digital images. Dr. Wilson said that the JVN is particularly well suited for smaller clinics and those in rural areas because it can save a patient who lives in a rural area a trip to an eye specialist's office that might be located several miles away.

"The majority of people who have an annual retinal exam as a part of surveillance for diabetic retinopathy, most of them need that exam but don't require any eye professional or eye care. They need their blood pressure controlled, their blood sugar and lipids controlled, they don't spend time with an eye care professional. So, for a person in a rural area, if this retinal imaging can take place, it will save them the trip, travel and transport of going to the big facility to get an eye care professional exam, or alternatively save the time of an eye care professional to travel to a rural area or a smaller facility to provide what is basically a low-risk surveillance screening," Dr. Wilson said.